APPENDIX I
Hydraulic Analysis

NDOR
Nebraska Department of Roads

Memorandum

DATE April 16, 2015

TO Jeffrey Soula, Local Projects

FROM Walter Rutherford, Bridge Hydraulic Consultant Coordinator WR

THRU Kirk Harvey, Assistant Bridge Engineer - Hydraulics DKH

Project: MAPA-5009(3)
120th Street from Stonegate to Roanoke
CN: ~~22777~~ 22277
U182513910

The compliance review of the consultant's hydraulic report/design indicates the consultant may proceed with the plans.

Please find attached the Data Sheet, Plan & Profile and the TS&L, for your review and distribution.

cc: ~~Michael Kleffner~~ Taylor Eman
Nikolas Glennie
Sherri Bridges
File

Preliminary Data Sheet

PROJECT NO:	MAPA-5009(3)	DATE:	December 23, 2014
CONTROL NO:	22277	COUNTY:	Douglas
STRUCTURE NO:	U182513910	LOCATION:	120th Street north of Stonegate
PROJECT NAME:	120th Street–Stonegate to Roanoke	SECTION:	7 & 8 T 15 N R 12 E
USGS DATUM:	NAVD 88	DELTA DATUM:	0.40 ft

SITE DESCRIPTION & DISPOSITION

Structure U182513910 carries traffic on 120th Street (in Omaha) across West Maple Creek. The channel flows easterly, where it empties into the Big Papillion Creek a short distance east of the project. The channel is well defined, with a bottom width of approximately 10-ft. and bank side slopes between 2:1 and 2.5:1. The existing bridge will be widened 10.5-ft. to each side.

EXISTING STRUCTURE

ORIGINAL PLAN:	BRM-5009(1)	PLAN YEAR:	1981
OTHER PLAN:	-	PLAN YEAR:	-
STATION:	499+18.00	SUFFICIENCY RATING:	76.8
TYPE:	Prestr. Concrete Double Tee	SKEW:	15°
LENGTH:	113 ft	CLEAR ROADWAY WIDTH:	46 ft
SPANS:	37'6" – 38' – 37'6"	LOW DECK STATION:	498+61.5
LOW STRUCTURE ELEVATION:	1053.20 ft	LOW DECK ELEVATION:	1056.33 ft

PROPOSED STRUCTURE

STATION:	499+18.00	SKEW:	15°
TYPE:	Twin Tee Girder	CLEAR ROADWAY WIDTH:	62 ft
LENGTH:	113 ft	RAILS:	Cl. Conc.
SPANS:	37'6" – 38' – 37'6"	CRITICAL BERM ELEVATION:	1046.03 ft
ABUT TYPE:	R/C Wall	BOTTOM OF WALL ELEVATION:	1046.04 ft
PIER/BENT TYPE:	Open Pile Bent	BOTTOM ENCASEMENT ELEVATION:	N/A ft
WING TYPE:	U-Shape		

GRADE

BRIDGE GRADE ABUTMENT 1:	1056.14 ft	BRIDGE GRADE ABUTMENT 2:	1057.01 ft
LOW STRUCTURE ELEVATION:	1052.83 ft	SUPERSTRUCTURE DEPTH:	3.31 ft
FREEBOARD-REQUIRED:	1 ft	FREEBOARD-DESIGN:	1.9 * ft
ROAD OVERFLOW DESIGN:	N/A		

DESIGN HYDRAULIC DATA

STREAM: West Maple Creek

Q100:	4800 cfs	(BASE FLOOD)	DRAINAGE AREA:	3.4 mi²
Q100:	4800 cfs	(BRIDGE BASE FLOOD)	HW ELEVATION. (DS):	1050.9* ft
Q(>500):	N/A cfs	(OVERTOPPING FLOOD)	LOW ROAD ELEVATION:	N/A ft
Q (OHW):	290 cfs		ORDINARY HIGH WATER ELEVATION:	1032.00 ft
ICE-AFFECTED:	N/A		WATERWAY AREA BELOW HW:	326 ft²

Q100 GENERAL SCOUR: 3 ft Q100 LOCAL SCOUR: 7 ft Q500 SCOUR ELEV: 1021 ft

CHANNEL DATA

SIDE SLOPES:	H 2.5 : V 1	BOTTOM WIDTH:	10 ft
BERM ELEVATION:	1047.5 ft	BERM WIDTH:	5 ft
FLOWLINE ELEVATION:	1030.2 ft	RIP RAP:	Type B

PERMITS

404: Yes CAUSEWAY/STRUCTURE: Yes LOCAL: Yes FEMA: Floodplain

TRAFFIC OPTIONS

ALIGNMENT SHIFT: No DETOUR: No TEMPORARY ROAD: No UNDER TRAFFIC: Yes

TEMPORARY STRUCTURE DESIGN: - Q (-): - cfs SAG ELEVATION: - ft

COMMENTS: -

CONTRACTOR'S ACCESS CROSSING Culvert

SIZE: 3 - 48" CMP FILL: 2.0 ft Q(OVERTOPPING): 300 cfs

Preliminary Data Sheet

PROJECT NO:	MAPA-5009(3)	DATE:	December 23, 2014
CONTROL NO:	22277	COUNTY:	Douglas
STRUCTURE NO:	U182513910	LOCATION:	120th Street north of Stonegate
PROJECT NAME:	120th Street–Stonegate to Roanoke	SECTION:	7 & 8 T 15 N R 12 E

HYDRAULIC DESIGN DETAILS/SKETCH

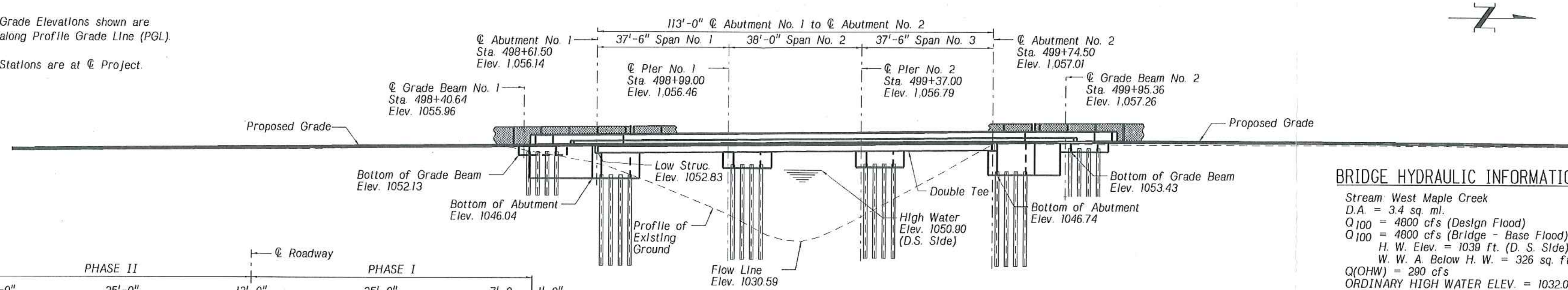
NOTE:
See Attached.
* See hydraulic study document and appendices for information regarding concurrent storms on the West Maple Creek and Big Papillion Creek. HW at XS 953 during Q100 on the West Maple Creek is 1038.99; the freeboard, as calculated at the upstream internal bridge cross section, is 12.4-ft. HW at XS 953 during concurrent Q100 events on the West Maple Creek and Big Papillion Creek is 1050.93; the freeboard (calculated at the internal upstream cross section of the bridge) is 1.84-ft.

PROFESSIONAL CIVIL ENGINEER
MARIE A. STAMM
E-11637
STATE OF NEBRASKA
12/23/14

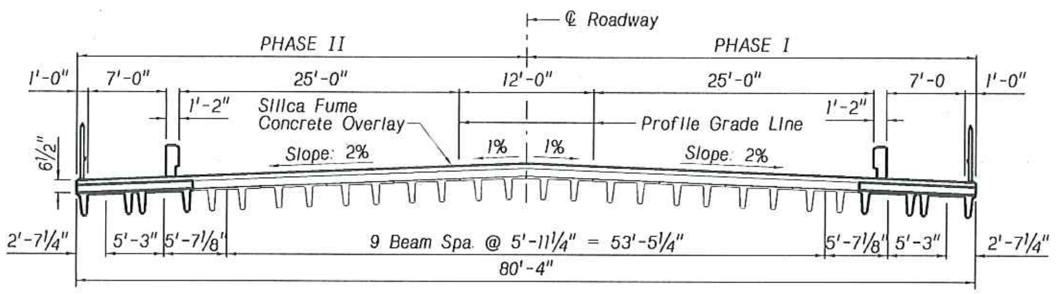
SITE 1 OF 2
SHEET 2 OF 3

Grade Elevations shown are along Profile Grade Line (PGL).

Stations are at ℄ Project.



SECTIONAL ELEVATION
Scale: 1/16" = 1'-0"



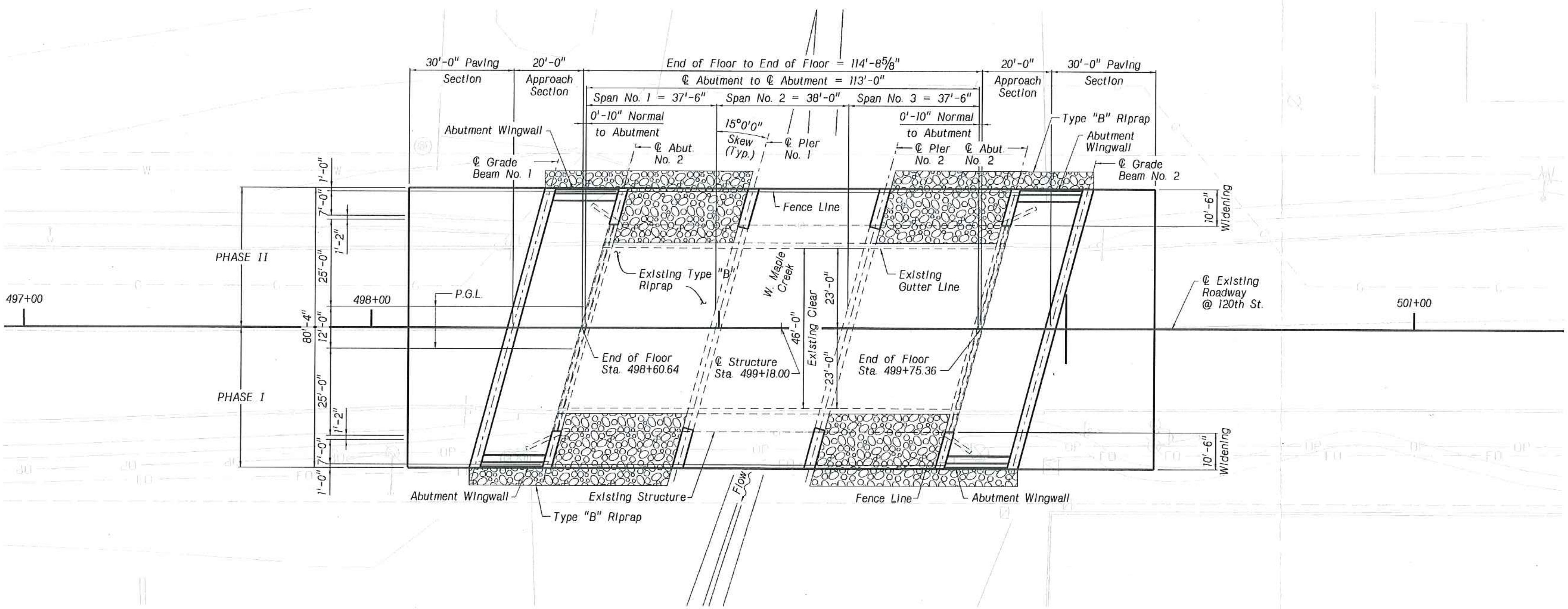
CROSS SECTION OF SLAB
Not to Scale

PROFILE GRADE
Not to Scale

BRIDGE HYDRAULIC INFORMATION

Stream: West Maple Creek
D.A. = 3.4 sq. mi.
Q_{100} = 4800 cfs (Design Flood)
Q_{100} = 4800 cfs (Bridge - Base Flood)
H. W. Elev. = 1039 ft. (D. S. Side)
W. W. A. Below H. W. = 326 sq. ft.
Q(OHW) = 290 cfs
ORDINARY HIGH WATER ELEV. = 1032.00
Q_{100} General Scour = 3 ft.
Q_{100} Local Scour = 7 ft.
Q_{500} Scour Elev. = 1021 ft.

Stream: West Maple Creek Q_{100}
with concurrent Big Papillion Creek Q_{100}
H.W. Elev. = 1050.90 (D.S. Side)
W.W.A. Below H.W. = 1128 sf. ft.
Q(OHW) = 290 cfs
ORDINARY HIGH WATER ELEV. = 1032.00
Q_{100} General Scour = 3 ft.
Q_{100} Local Scour = 7 ft.
Q_{500} Scour Elev. = 1021 ft.



GENERAL PLAN
Scale: 1/16" = 1'-0"

SCHEMMER
ARCHITECTS | ENGINEERS | PLANNERS

DATE: 12/23/2014
TIME: 10:33:25 AM

PROJECT NUMBER	SHEET NO.
MAPA-5009(3)	x

C.N. 22277

STRUCTURE NUMBER
U182513910

113'-0" THREE SPAN
TWIN TEE GIRDER BRIDGE
PLAN AND ELEVATION

COUNTY DOUGLAS
LOCATION 120th St. S. of W. Maple
HWY. NO.
SKEW 15°
REF. POST.
ROADWAY 62'-0"
STA. 499+18.00
DESIGN LIVE LOAD HL-93
DESIGNED BY DGB
DETAILED BY TLN
CHECKED BY SDK
DATE DECEMBER 2014

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR
Nebraska Department of Roads

PRELIMINARY PLAN
$$PU-SUB$$
SUBMITTAL
12/23/2014
NOT FINAL - SUBJECT TO CHANGE

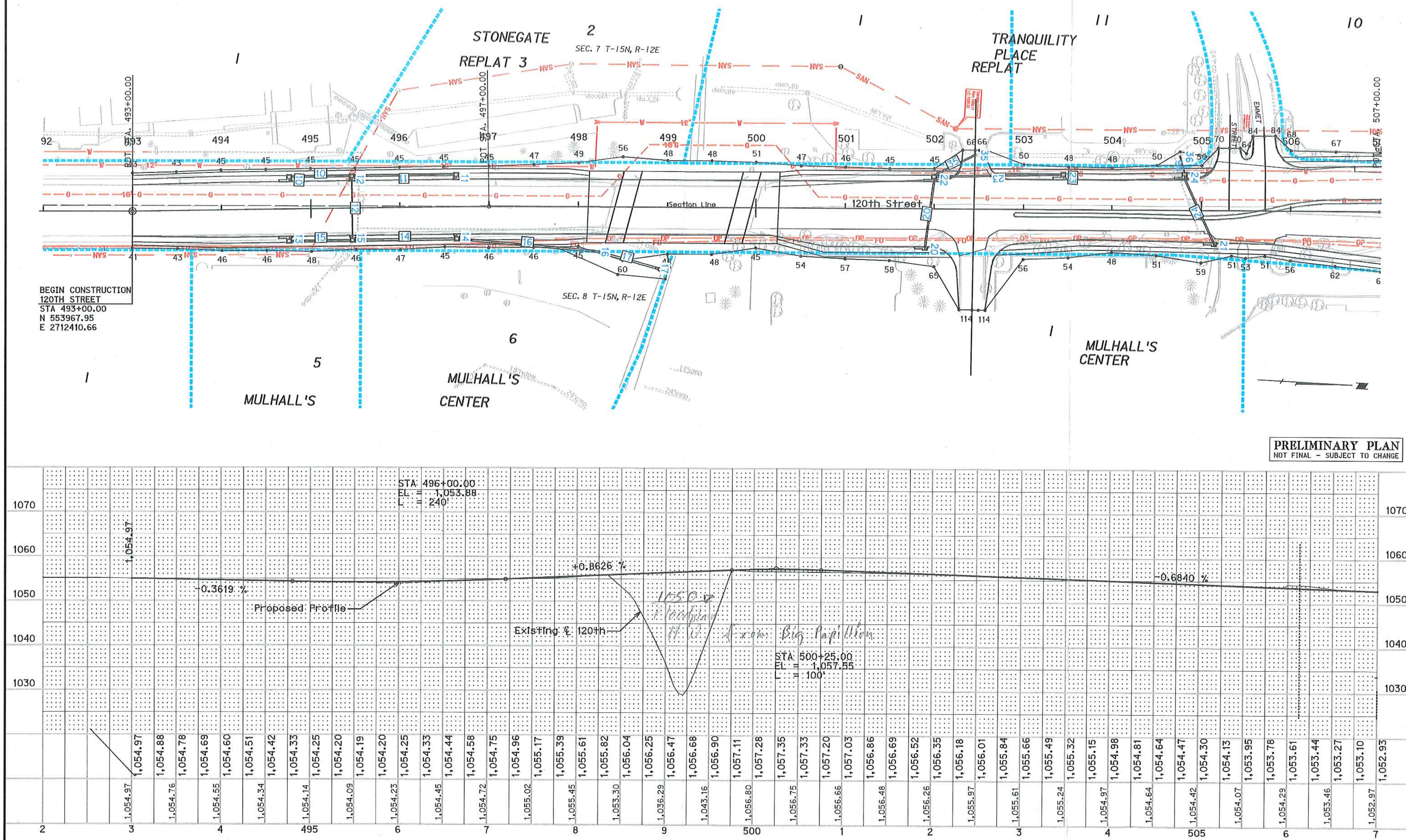
OPW 50949

SPECIAL PLAN NO.
1

17

120TH STREET - CITY OF OMAHA

PROJECT NO.	C.N.
MAPA-5009(3)	22277



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PLAN & PROFILE

GRAPHIC SCALE : FEET

CITY OF OMAHA
PUBLIC WORKS DEPARTMENT

OPW-50949

SHEET NO. 3

Nebraska Department of Roads

Memorandum

DATE August 25, 2015

TO Jeffrey Soula, Local Projects

FROM Walter Rutherford, Bridge Hydraulic Consultant Coordinator WR

THRU Kirk Harvey, Assistant Bridge Engineer - Hydraulics DKH

Project: MAPA-5009(3)
120th Street from Stonegate to Roanoke
CN: ~~22777~~ 22277
U182513915

The review of the consultant's updated hydraulic report/design is complete and the consultant may proceed with the plans.

Please find attached the updated Data Sheet, Plan & Profile and the TS&L, for your review and distribution.

cc: Nikolas Glennie
Sherri Bridges
File

Preliminary Data Sheet

PROJECT NO:	MAPA-5009(3)	DATE:	May 8th, 2015
CONTROL NO:	22277	COUNTY:	Douglas
STRUCTURE NO:	U182513915	LOCATION:	120th Street over Big Papio Creek
PROJECT NAME:	120th Street – Stonegate to	SECTION:	5,6 T 15N R 12E
USGS DATUM:	NAVD88	DELTA DATUM:	0.40 ft

SITE DESCRIPTION & DISPOSITION

Existing: Two-lane roadway and bridge on 120th Street, between West Maple Road and Fort Street over the Big Papillion Creek. Knolls Golf Course – downstream, Tranquility Park – upstream. Proposed: Bridge will accommodate a 68-ft urban four-lane divided roadway with 16-ft raised median and sidewalks. Well defined channel with 25-ft bottom width and 2:1 sideslopes.

EXISTING STRUCTURE

ORIGINAL PLAN:	SP 78-54	PLAN YEAR:	1980
OTHER PLAN:	-	PLAN YEAR:	-
STATION:	528+15.00		
TYPE:	Steel Girder	SKEW:	25°RHB
LENGTH:	200 ft	CLEAR ROADWAY WIDTH:	30 ft
SPANS:	62-'6" - 75'-0" - 62'-6"	LOW DECK STATION:	527+08.00
LOW STRUCTURE ELEVATION:	1055.74 ft	LOW DECK ELEVATION:	1059.01 ft

PROPOSED STRUCTURE

STATION:	528+15.00		
TYPE:	NU1100	SKEW:	25°RHB
LENGTH:	295 ft	CLEAR ROADWAY WIDTH:	68 ft
SPANS:	95'-0" - 105'-0" - 95'-0"	RAIL TYPE:	Cl. Conc.
ABUTMENT TYPE:	Sheet Pile	CRITICAL BERM ELEVATION (MIN):	1030.90 ft
PIER TYPE:	Conc. Encased Pile Bent	BOTTOM OF ABUTMENT WALL (MIN):	1014.90 ft
WING TYPE:	U-Shaped	BOTTOM OF PIER ENCASEMENT:	1022.00 ft

GRADE

BRIDGE GRADE ABUTMENT 1:	1062.19 ft	BRIDGE GRADE ABUTMENT 2:	1062.19 ft
LOW STRUCTURE ELEVATION:	1056.95* ft	SUPERSTRUCTURE DEPTH:	5.07** ft
REQUIRED FREEBOARD:	1 ft	DESIGN FREEBOARD:	1.14 ft
ROAD OVERFLOW DESIGN:	N/A		

DESIGN HYDRAULIC DATA

STREAM:	Big Papillion Creek			
Q100:	34,350 cfs	(BASE FLOOD)	CONTRIBUTING DRAINAGE AREA:	132 mi^2
Q100:	30,150 cfs	(BRIDGE BASE FLOOD)	HW ELEVATION (US):	1055.81 ft
Q(10):	17,180 cfs	(OVERTOPPING FLOOD)	LOW ROAD ELEVATION:	1052.52 ft
Q (OHW):	10,150 cfs		ORDINARY HIGH WATER ELEVATION:	1038.70 ft
ICE-AFFECTED:	No		WATERWAY AREA BELOW HW:	5,890 ft^2

Q100 GENERAL SCOUR: 8 ft Q100 LOCAL SCOUR: 6 ft Q500 SCOUR ELEV: 1018.00 ft

BERM DATA

TOP OF GROUND ELEVATION:	1042.52 ft	TOP OF RIP RAP ELEVATION:	N/A ft
BOTTOM OF RIP RAP WIDTH:	N/A ft	RIP RAP TYPE:	N/A ft

FLOODPLAIN CERTIFICATION

FEMA CLASSIFICATION : Floodway

TRAFFIC OPTIONS

ALIGNMENT SHIFT: Yes DETOUR: Yes TEMPORARY ROAD: No UNDER TRAFFIC: No

TEMPORARY STRUCTURE DESIGN: N/A Q (-): - cfs SAG ELEVATION: - ft

CONTRACTOR ACCESS CROSSING Culvert

SIZE: 3 - 60" CMP FILL: 1.5 ft

COMMENTS:

*Corresponds to low structure elevation at face of south abutment wall (sta. 526+53.87) at exterior beam.

**Includes 1% corss slope from P.G.L. up to centerline of median at low structure stationing of 526+53.87.

BR FORM 359A, FEBRUARY 2015

Preliminary Data Sheet

PROJECT NO:	MAPA-5009(3)	DATE:	May 8th, 2015
CONTROL NO:	22277	COUNTY:	Douglas
STRUCTURE NO:	U182513915	LOCATION:	120th Street over Big Papio Creek
PROJECT NAME:	120th Street – Stonegate to	SECTION:	5,6 T 15N R 12E

HYDRAULIC DESIGN DETAILS/SKETCH

NOTE:
SEE ATTACHED.

December 16th 2014 updates thru April, 2015 comments and revisions:

In responding to hydraulic review comments from NDOR the following items are explained in greater detail:

The Design Hydraulic Data and the Channel Data stated in the sections above are based on information from a April, 2015 revised hydraulic study developed by The Schemmer Associates which included minor revisions to a PBS&J hydraulic study from May 2010. Q(OHW) and ORDINARY HIGH WATER ELEVATION values were documented from the 2010 hydraulic study for regulatory review, permitting, and No-Rise approval received on January 20th, 2010, pursuant to protecting existing channel below the documented elevation.

Using normal definition of ORDINARY HIGH WATER as the natural occurring vegetated line, a secondary set of values are documented to properly size the Contractors Access Crossing as shown above
Q (OHW): 430 cfs ORDINARY HIGH WATER ELEVATION: 1031.00 ft

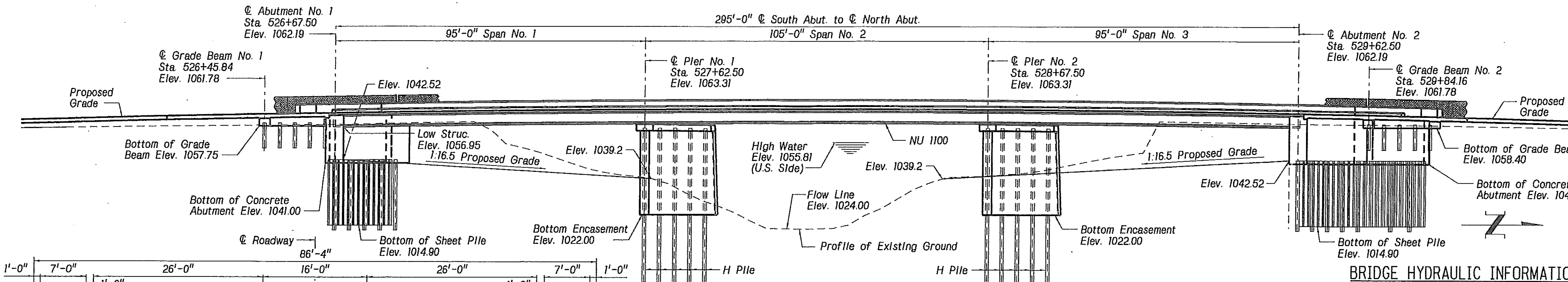
Q500 Scour based on calculated contraction in channel (0 ft) and local scour at pier (6 ft) as defined in the 2010 hydraulic study by PBS&J with 2015 amendments by Schemmer Associates.

PROFESSIONAL CIVIL ENGINEER
RANDALL R. GRAHAM
E-5464
STATE OF NEBRASKA

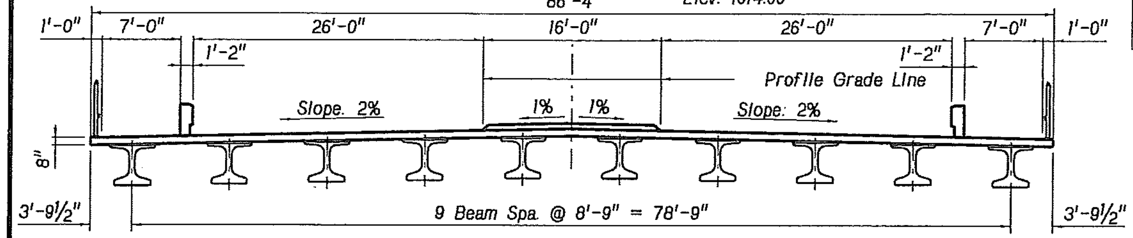
05/12/2015

for hydraulic and channel data.

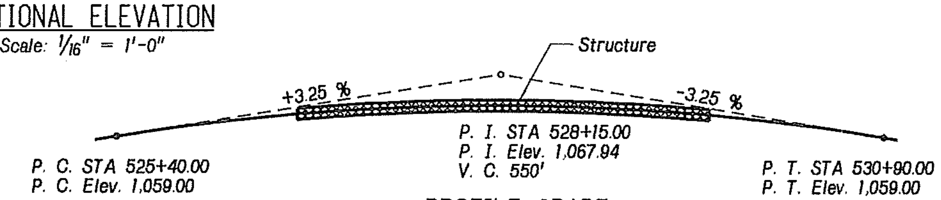
Grade Elevations shown are Profile Grade at ℄ Roadway Station



SECTIONAL ELEVATION
Scale: 1/16" = 1'-0"



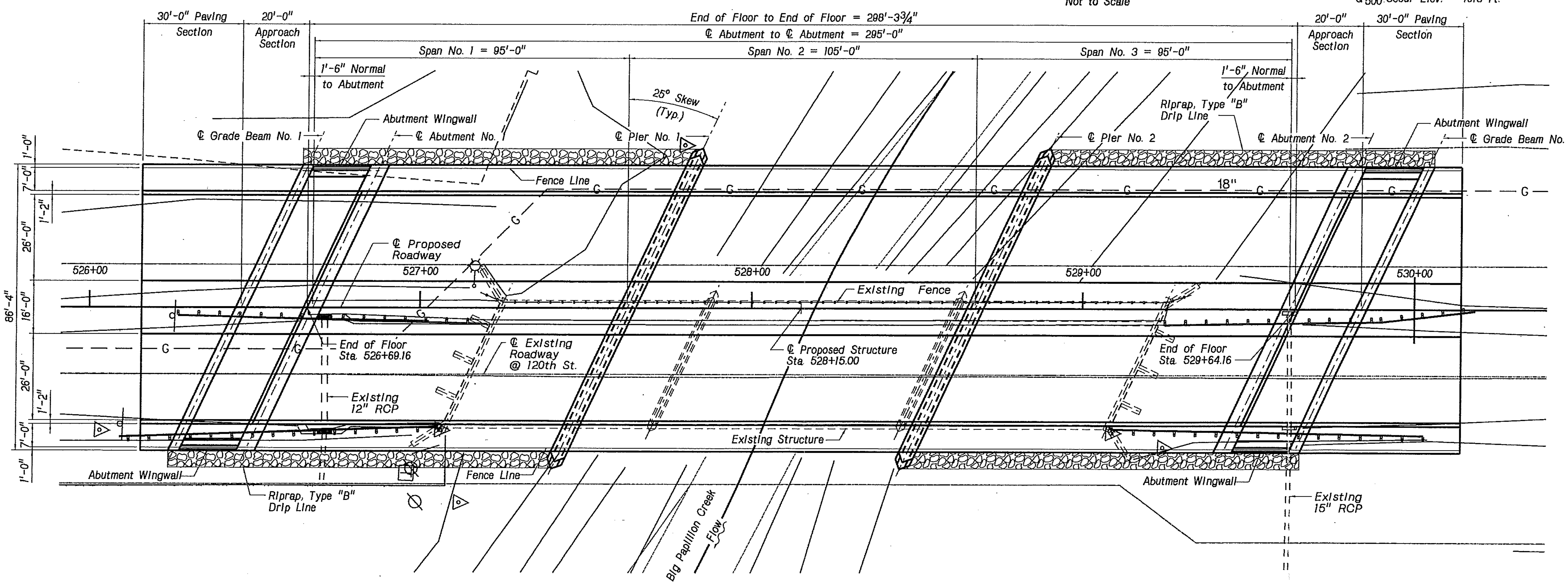
CROSS SECTION OF SLAB
Not to Scale



PROFILE GRADE
Not to Scale

BRIDGE HYDRAULIC INFORMATION

Stream: Big Papillion Creek
D.A. = 132 sq. mi.
Q_{100} = 34,350 cfs (Design Flood)
Q_{100} = 30,150 cfs (Bridge - Base Flood)
H. W. Elev. = 1055.81 ft. (U.S. Side)
W. W. A. Below H. W. = 5890 sq. ft.
Q = 17,180 cfs (Overtopping Flood)
Low road Elev. = 1052.52
Q (OHW) = 10,150 cfs
Ordinary High Water Elev. = 1038.70 ft.
Q_{100} General Scour = 8 ft.
Q_{100} Local Scour = 6 ft.
Q_{500} Scour Elev. = 1018 ft.



GENERAL PLAN
Scale: 1/16" = 1'-0"

SCHEMMER
ARCHITECTS | ENGINEERS | PLANNERS

DATE: 8/4/2015
TIME: $TIME$

PROJECT NUMBER	SHEET NO.
MAPA-5009(3)	×

C.N. 22277
STRUCTURE NUMBER U182513915

COUNTY DOUGLAS
LOCATION 120th St. N. of W. Maple
HWY. NO.
SKEW 25°
REF. POST.
ROADWAY 72'-0"
STA. 528+15.00
DESIGN LIVE LOAD HL 93
DESIGNED BY DGB
DETAILED BY TLN
CHECKED BY ITP
DATE MAY 2015

295'-0" THREE SPAN
CONCRETE GIRDER BRIDGE
PLAN AND ELEVATION

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

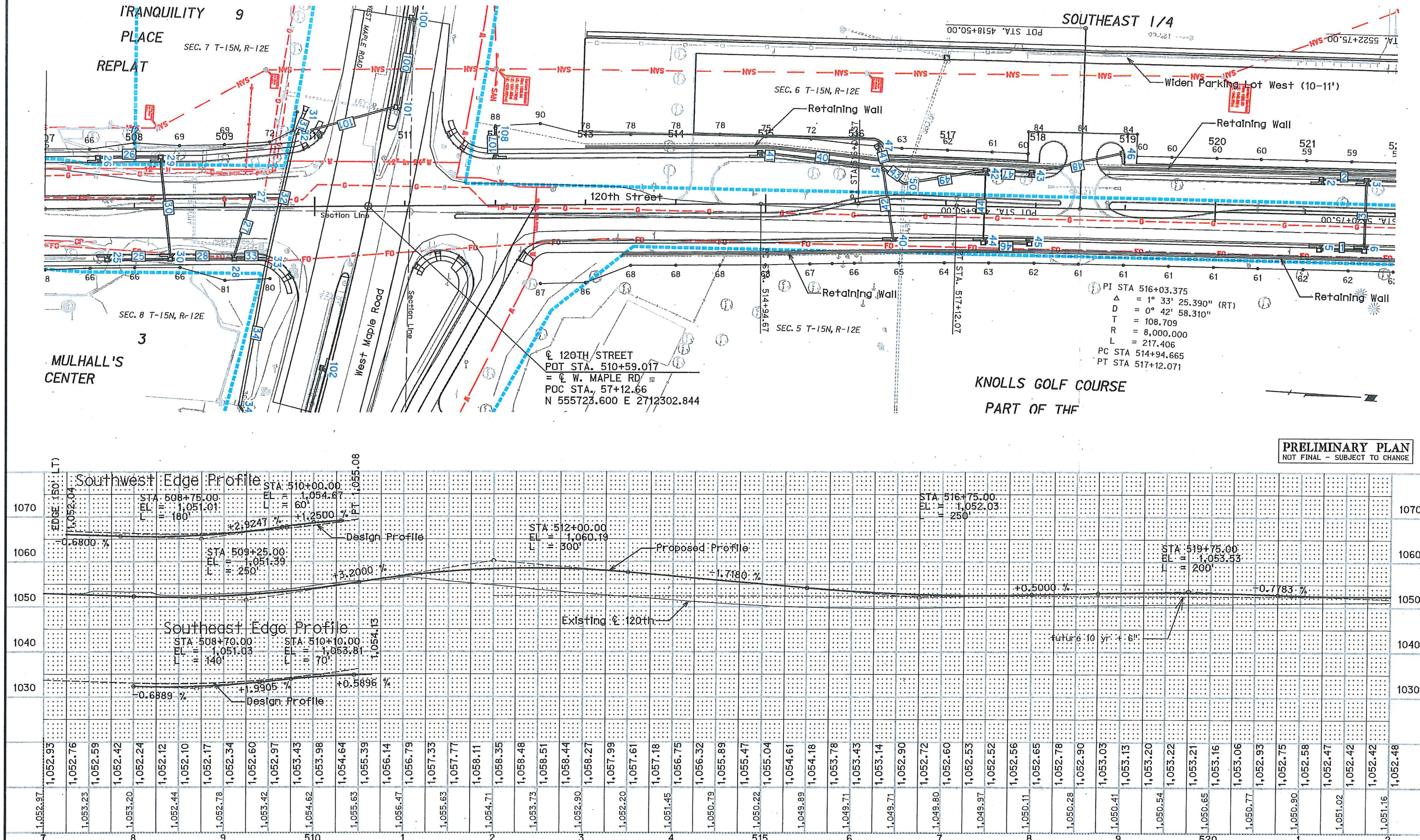
NDOR Nebraska Department of Roads

PRELIMINARY PLAN
$$PU-SUB$$
SUBMITTAL
8/4/2015
NOT FINAL - SUBJECT TO CHANGE

OPW 50949
SPECIAL PLAN NO. 2
18

120TH STREET - CITY OF OMAHA

PROJECT NO.	C.N.
MAPA-5009(3)	22277



PRELIMINARY PLAN
NOT FINAL - SUBJECT TO CHANGE

PLAN & PROFILE

CITY OF OMAHA
PUBLIC WORKS DEPARTMENT
OPW-50949
SHEET NO. 4

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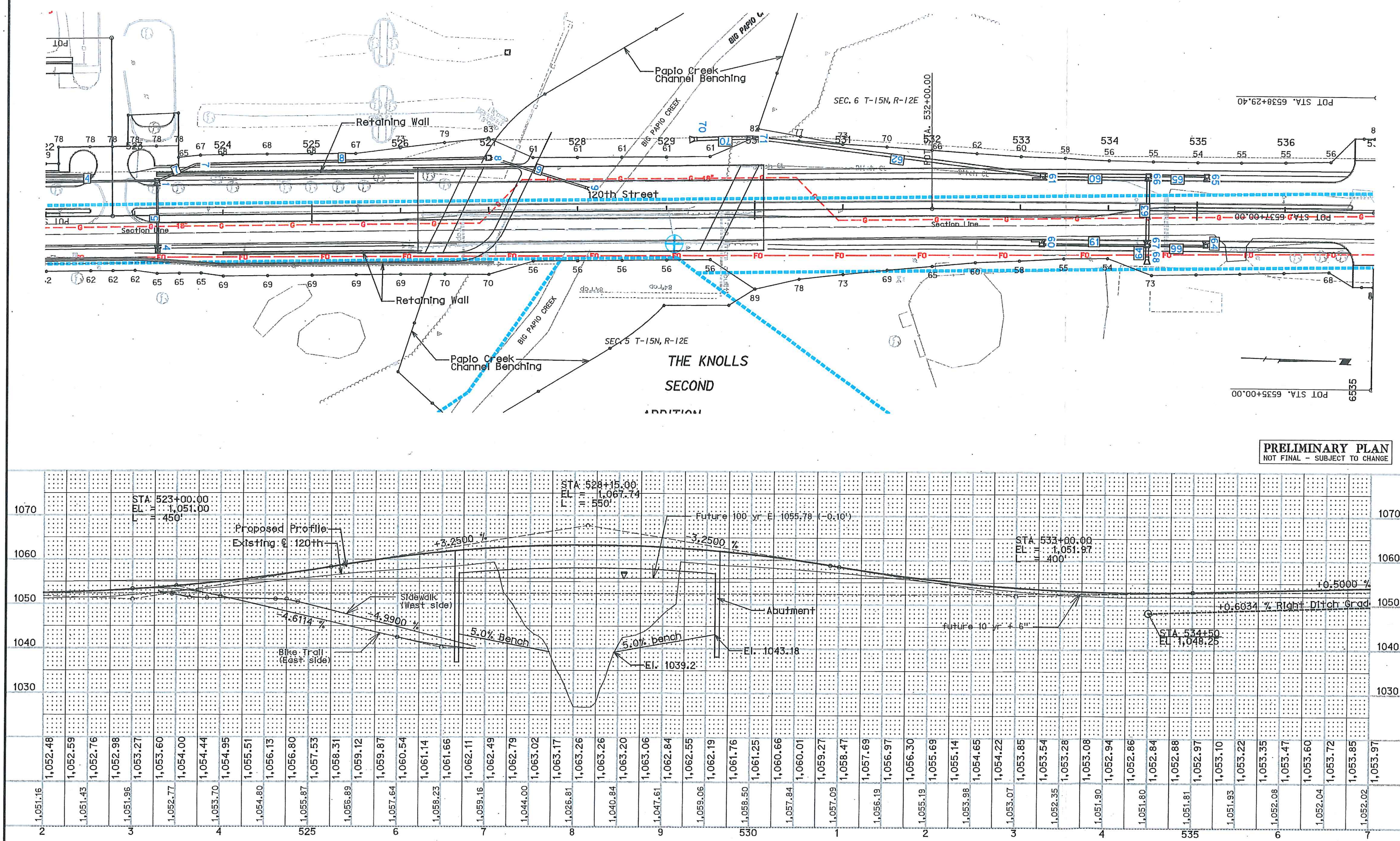
PROJECT NO.	C.N.
MAPA-5009(3)	22277

120TH STREET - CITY OF OMAHA



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PLAN & PROFILE

CITY OF OMAHA
PUBLIC WORKS DEPARTMENT

OPW-50949

SHEET NO. 5

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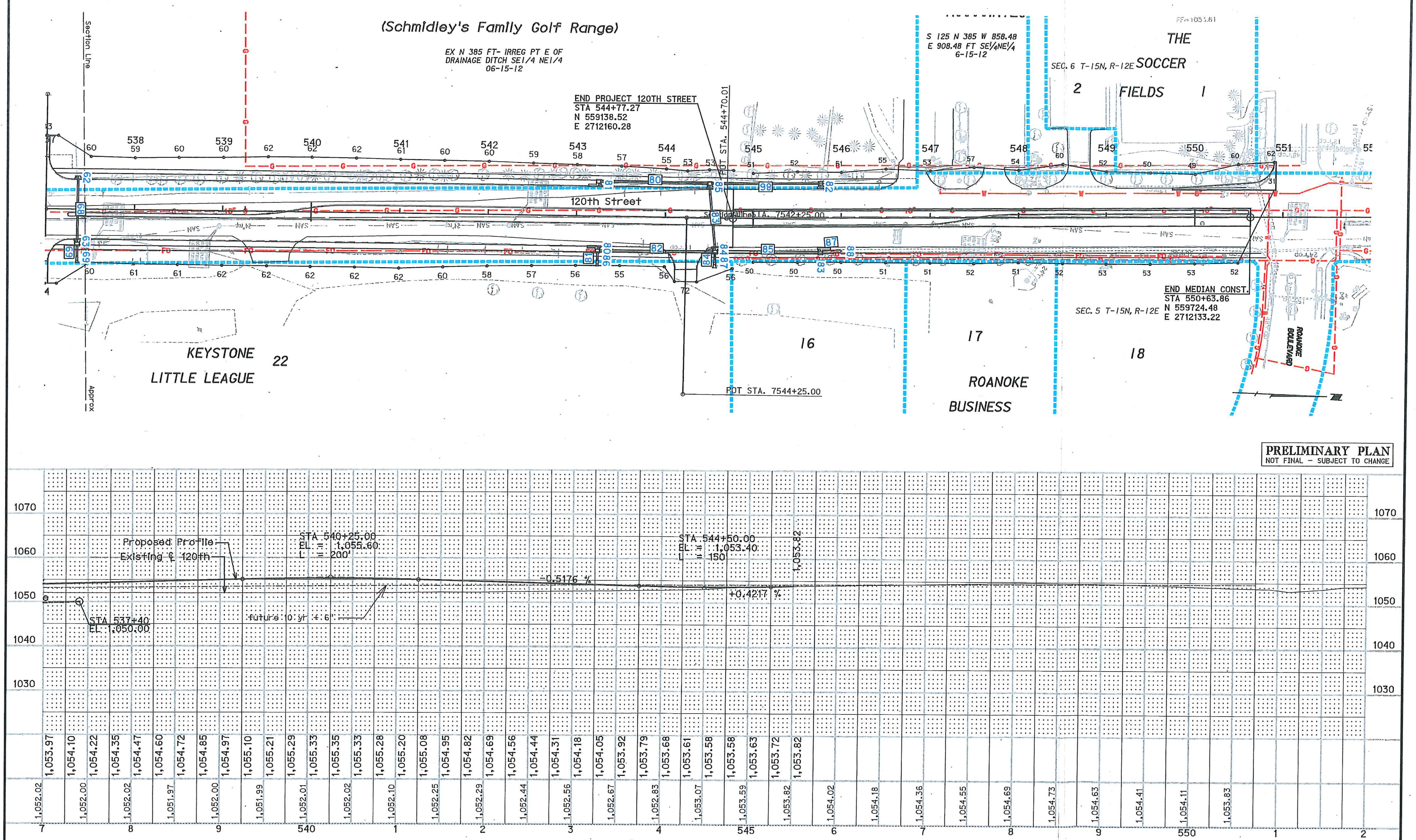
PROJECT NO.	C.N.
MAPA-5009(3)	22277

120TH STREET - CITY OF OMAHA



PLAN & PROFILE

GRAPHIC SCALE : FEET

CITY OF OMAHA
PUBLIC WORKS DEPARTMENT

OPW-50949

SHEET NO. 6

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